

What is Claimed:

1. A reconfigurable control system, comprising:  
a rear projection display including a projector and a display screen;  
a plurality of physical control details mounted to said screen;  
an electro-optical sensing system to sense the position of said plurality of control details; and  
a computer to control said projector and determine from said sensed control detail positions the desired inputs to said control system.
2. Apparatus according to claim 1 wherein said computer controls said display as a result of said sensed position, stored data, or an external source.
3. Apparatus according to claim 1 wherein said computer controls said display as a result of data inputted to said computer from an external source.
4. Apparatus according to claim 1 wherein said electro-optical sensing system is comprised by a TV camera.
5. Apparatus according to claim 1 wherein said electro-optical sensing system is comprised by an optical sensor incorporated into the projector.
6. Apparatus according to claim 1 wherein said computer additionally controls a desired function.
7. Apparatus according to claim 1 wherein at least one of said control details is a knob.
8. Apparatus according to claim 1 wherein absolute position of said control detail is determined.

9. Apparatus according to claim 1 including sensing of touch position on said screen.
10. Apparatus according to claim 9 wherein said touch sensing is also achieved electro-optically.
11. Apparatus according to claim 9 wherein said computer controls said display as a result of said sensed touch position.
12. Apparatus according to claim 1 wherein a datum on said physical control detail located on the users side of said screen is sensed.
13. Apparatus according to claim 1 wherein a datum is sensed on a member related to said physical control detail position is located on the projector side of said screen.
14. Apparatus according to claim 1 or 9 wherein force feedback is provided to the user as a result of said sensed control detail or touch position.
15. Apparatus according to claim 1 or 9 wherein force feedback is provided to the user as a result of data stored in computer memory or inputted from external sources.
16. Apparatus according to claim 1 wherein said screen incorporates at least one relief feature.
17. Apparatus according to claim 16 wherein said relief feature does not unduly disrupt images projected on said screen.
18. Apparatus according to claim 1 wherein said physical control detail is transparent.

19. Apparatus according to claim 1 wherein said physical control detail has a opening through which said screen may be viewed.
20. Apparatus according to claim 1 wherein at least one of said physical control details is a slider, switch or dial.
21. Apparatus according to claim 1 wherein said projection means is a flying spot scanning type.
22. Apparatus according to claim 1 wherein said projection means is a image modulating type such as DLP or LCOS.
23. Apparatus according to claim 1 wherein said screen incorporates two knobs spaced horizontally.
24. Apparatus according to claim 23 wherein displayed image on said screen corresponds to a radio configured around said two knobs, and said radio image is later reconfigured to another function.
25. A reconfigurable instrument panel for a vehicle comprising:  
a display having a screen;  
at least one physical control detail mounted to said screen;  
a touch sensing means for sensing xy touch position on at least a portion of said display; and  
a computer to control said display, and to determine said at least one physical control detail position and said touch position.
26. Apparatus according to claim 25 wherein said display is rear projection display further including a projector.

27. Apparatus according to claim 25 wherein said display is located in the center stack of said vehicle.
28. Apparatus according to claim 25 wherein said screen is curvilinear.
29. Apparatus according to claim 25 wherein said screen is irregular.
30. Apparatus according to claim 25 wherein said display at least 10 x 9 inches in extent or area.
31. Apparatus according to claim 25 wherein said display is located in the center stack of said vehicle and extends toward the steering wheel of said vehicle.
32. Apparatus according to Claim 25 wherein said display screen is made of plastic.
33. Apparatus according to claim 25 wherein video images are displayed on an upper portion of said display so as to be easily seen by the driver of said vehicle.
34. Apparatus according to claim 25 wherein at least one of said control details or said touch position is sensed electro-optically.
35. Apparatus according to claim 25 wherein said computer further controls a function of the vehicle.
36. Apparatus according to claim 25 wherein said screen is easily interchanged.
37. Apparatus according to claim 25 wherein said screen incorporates relief features to aid operation by feel.

38. Apparatus according to claim 25 wherein said screen incorporates force feedback features controlled by said computer to aid operation of said physical control details by feel.
39. Apparatus according to claim 25 wherein said screen incorporates force feedback features controlled by said computer to aid operation of said touch position sensing by feel.
40. Apparatus according to claim 25 wherein displayed data is comprised of labels and other data relating to the function of one or more of said physical control details.
41. Apparatus according to claim 33 wherein video image can be touched at a desired location to acknowledge or confirm data presented.
42. Apparatus according to claim 25 wherein said touch sensing is responsive to a gesture of a person using one or two fingers.
43. Apparatus according to claim 42 wherein said gesture is a sliding gesture.
44. Apparatus according to claim 42 wherein said gesture is a turning gesture.
45. Apparatus according to claim 1 wherein said computer is further used to process data from other electro-optical systems within the vehicle.
46. Apparatus according to claim 25 wherein data to be acted on by touch is projected on said screen under control of said computer.
47. An Instrument Panel for a vehicle comprising:  
an extensive rear projection display controlled by a computer; and  
at least one physical control detail located on the surface of the screen of said display.

48. Apparatus according to claim 47 including an Electro-optical means for sensing information from a plurality of points on said surface, and providing said information to said computer to effect said control.

49. Apparatus according to claim 48 wherein said Information is state of a control detail.

50. Apparatus according to claim 48 wherein said Information is position of control detail.

51. Apparatus according to claim 48 wherein said Information is position of a finger touch on said surface.

52. Apparatus according to claim 47 wherein said video data is projected on said surface.

53. Apparatus according to claim 47 wherein said data is projected on said surface in order to reconfigure the function of said control details.

54. A method for controlling a system comprising:  
providing a rear projection display controlled by a computer;  
providing, on a screen of said display a plurality of control details;  
providing an electrooptical sensing means for sensing said plurality of control details  
using data from said sensing means, and said computer, determining the position of at least one of said control details; and  
controlling said system as a result of said sensed position.

55. A Method for sensing a plurality of physical control details on a screen surface of a vehicle instrument panel comprising the steps of:

providing an electro-optical sensing means on a side opposite said surface from a driver of said vehicle;

providing a means for illumination of said control details;

optimizing at least one of said illumination and said sensing means as a function of ambient light in said vehicle; and

determining from said electrooptical sensing means the position of at least one datum on each of said plurality of control details.